

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claims 1-15. (Cancelled)

16. (New) A specified pattern detection apparatus comprising:

a plurality of filters provided for image detection;

an extractor which extracts a specified pattern included in an image with use of a combination of filters in said plurality of filters to determine a position of the specified pattern; and

a calculator which determines the position of the specified pattern more precisely than said extractor, based on the position determined by said extractor.

17. (New) The specified pattern detection apparatus according to claim 16, further comprising:

a binarizer which binarizes input image data to provide bi-level image data;

an image extractor which extracts specified partial images included in the specified pattern, in the bi-level image data obtained by said binarizer; and

a reduced image generator which generates a reduced image of an image including the specified partial images, the reduced image having a lower resolution than the image including the specified partial images;

wherein said extractor extracts the specified pattern included in the reduced image generated by said reduced image generator.

18. (New) The specified pattern detection apparatus according to claim 16, wherein the filters in the combination of filters are positioned along a circumferential line.

19. (New) The specified pattern detection apparatus according to claim 17, wherein the filters in the combination of filters are positioned along a circumferential line.

20. (New) The specified pattern detection apparatus according to claim 16, wherein the plurality of filters are provided for extracting a plurality of types of specified patterns.

21. (New) The specified pattern detection apparatus according to claim 17, wherein the plurality of filters are provided for extracting a plurality of types of specified patterns.

22. (New) A method for detecting a specified pattern comprising the steps of:
extracting a specified pattern included in an image with use of a combination of filters in a plurality of filters provided for image detection and determining a position of the specified pattern; and

further determining the position of the specified pattern more precisely based on the determined position.

23. (New) The method according to claim 22, further comprising the steps of:

binarizing input image data to provide bi-level image data;

extracting specified partial images in the bi-level image data; and

generating a reduced image of an image including the specified partial images, the reduced image having a lower resolution than the image including the specified partial images;

wherein the specified pattern is extracted in the reduced image.

24. (New) A specified pattern detection apparatus comprising:

a binarizer which binarizes input image data to provide bi-level image data;

a storage device which stores the bi-level image data obtained by said binarizer;

a partial image extractor which extracts specified partial images in the bi-level image stored in said storage device with a filter for conversion;

a gain calculator which calculates information for each pixel in the bi-level image, in which the specified partial images are extracted, with a gain filter, the information representing a distance from the each pixel to the specified partial image;

a position calculator which calculates ideal positions of the partial images to be included in a specified pattern; and

a gain output device which outputs a gain on the ideal positions based on the information obtained by said gain calculator.

25. (New) The specified pattern detection apparatus according to claim 24, wherein said conversion filter converts the partial image stored in said storage device to 1-bit data.

26. (New) A method for detecting a specified pattern comprising the steps of:
binarizing input image data to provide bi-level image data;
storing the bi-level image data;
extracting specified partial images in the bi-level image stored with a filter for conversion;

calculating information for each pixel in the bi-level image, in which the specified partial images are extracted, with a gain filter, the information representing a distance from the each pixel to the specified partial image;

calculating ideal positions of the partial images;

outputting a gain on the calculated ideal positions based on the information obtained by said gain calculator.
